Operating Instructions

Vibrating level switch for granulated bulk solids

VEGAVIB 61

- two-wire

Document ID: 29268

Contents

1 About this document
1.1 Function ... 4
1.2 Target group ... 4
1.3 Symbols used ... 4

2 For your safety
2.1 Authorised personnel ... 5
2.2 Appropriate use ... 5
2.3 Warning about incorrect use ... 5
2.4 General safety instructions ... 5
2.5 Safety label on the instrument ... 6
2.6 CE conformity ... 6
2.7 SIL conformity ... 6
2.8 Safety instructions for Ex areas ... 6
2.9 Environmental instructions ... 6

3 Product description
3.1 Configuration ... 7
3.2 Principle of operation ... 7
3.3 Operation ... 8
3.4 Storage and transport ... 8

4 Mounting
4.1 General instructions ... 10
4.2 Mounting instructions ... 11

5 Connecting to power supply
5.1 Preparing the connection ... 14
5.2 Connection procedure ... 14
5.3 Wiring plan, single chamber housing ... 15
5.4 Wiring plan - version IP 66/IP 68, 1 bar ... 17

6 Setup
6.1 General information ... 18
6.2 Adjustment elements ... 18
6.3 Function chart ... 19
6.4 Recurring test and function test (SIL) ... 21

7 Maintenance and fault rectification
7.1 Maintenance ... 25
7.2 Rectify faults ... 25
7.3 Exchanging the electronics module ... 26
7.4 How to proceed if a repair is needed ... 27

8 Dismount
8.1 Dismounting steps ... 28
8.2 Disposal ... 28

9 Supplement
9.1 Technical data ... 29
9.2 Dimensions ... 32

29268-EN-140625

Supplementary documentation

Information:
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

Instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your VEGAVIB 61, we offer accessories and replacement parts. The corresponding documentations are:

- 31086 - External housing - VEGAVIB
- 30172 - Electronics module VEGAVIB series 60
- 34296 - Protective cover

Editing status:2014-05-26

29268-EN-140625

1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained specialist personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbols used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.

Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.

Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

SIL applications
This symbol indicates instructions for functional safety which must be particularly taken into account for safety-relevant applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence of actions**
Numbers set in front indicate successive steps in a procedure.

Battery disposal
This symbol indicates special information about the disposal of batteries and accumulators.

29268-EN-140625

2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

2.2 Appropriate use

The VEGAVIB 61 is a sensor for point level detection.

You can find detailed information about the area of application in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.

2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, VEGA provides a confirmation of successful testing. You can find the CE conformity declaration in the download area of "www.vega.com".

2.7 SIL conformity

VEGAVIB 61 meets the requirements of functional safety according to IEC 61508. Further information is available in the Safety Manual "*VEGAVIB series 60*".

2.8 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.9 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfill this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGAVIB 61 point level switch
- Documentation
  - this operating instructions manual
  - Safety Manual "*Functional safety (SIL)*" (optional)
  - Supplementary instructions manual "*Plug connector for level sensors*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex versions)
  - if necessary, further certificates

Constituent parts

The VEGAVIB 61 consists of the components:

- Housing cover
- Housing with electronics
- Process fitting with vibrating rod

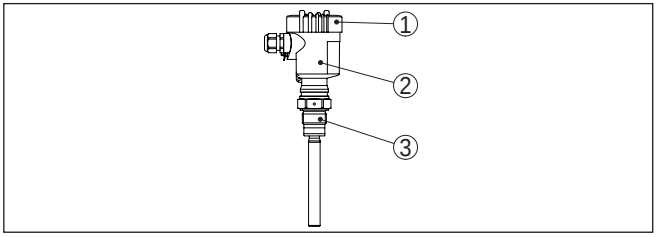

Fig. 1: VEGAVIB 61 - with plastic housing

1 Housing cover
2 Housing with electronics
3 Process fitting

Type label

The type label contains the most important data for identification and use of the instrument:

- Article number
- Serial number
- Technical data
- Article numbers, documentation
- SIL identification (with SIL rating ex works)

With the serial number, you can access the delivery data of the instrument via www.vega.com, "*VEGA Tools*" and "*serial number search*". In addition to the type label outside, you can also find the serial number on the inside of the instrument.

3.2 Principle of operation

Application area

VEGAVIB 61 is a point level sensor with vibrating rod for level detection.

It is designed for industrial use in all areas of process technology and is preferably used for bulk solids.

Typical applications are overfill and dry run protection. Thanks to its simple and robust measuring system, VEGAVIB 61 is virtually unaffected by the chemical and physical properties of the bulk solid.

It also works when subjected to strong external vibrations or changing products.

Solid detection in water
If VEGAVIB 61 was ordered for solid detection in water, the vibrating rod is calibrated to the density of water. If covered by water (density: 1 g/cm³/0.036 lbs/in) VEGAVIB 61 signals "uncovered". Only if the vibrating element is also covered with solids (e.g. sand, sludge, gravel etc.) will the sensor signal "covered".

Function monitoring
The electronics module of VEGAVIB 61 monitors continuously the following criteria:

- Correct vibrating frequency
- Line break to the piezo drive

If one of these faults is detected, the electronics signals this via a defined current to the signal conditioning instrument. The connection cable to the vibrating element is also monitored.

Functional principle

The vibrating rod is piezoelectrically energised and vibrates at its mechanical resonance frequency of approx. 360 Hz. When the vibrating rod is submerged in the product, the vibration amplitude changes. This change is detected by the integrated electronics module and converted into a switching command.

Voltage supply

Depending on your requirements, VEGAVIB 61 with two-wire electronics can be connected to different signal conditioning instruments. Compatible signal conditioning instruments are listed in chapter "*Technical data*".

The data for power supply are specified in chapter "*Technical data*".

3.3 Operation

With the factory setting, products with a density of > 0.05 g/cm³ (0.002 lbs/in³) can be measured. It is possible to adapt the instrument for products with lower density > 0.02 g/cm³ (0.0007 lbs/in³).

On the electronics module you will find the following display and adjustment elements:

- Signal lamp for indication of the switching condition (green/red)
- Potentiometer for adaptation to the product density
- Mode changeover for selection of the output current

3.4 Storage and transport

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging of standard instruments consists of environment-friendly, recyclable carton material. The sensing element is additionally protected with a cardboard cover. For special versions, PE foam or PE foil is also used. Please dispose of the packaging material through specialised recycling companies.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument coming in direct contact with the process, especially the sensor element, process seal and process fitting, are suitable for the existing process conditions, such as process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" and on the nameplate.

Switching point

In general, VEGAVIB 61 can be installed in any position. The instrument only has to be mounted in such a way that the vibrating element is at the height of the desired switching point.

Moisture

Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

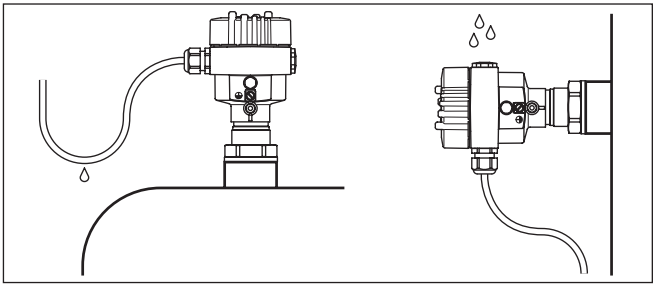

Fig. 2: Measures against moisture penetration

Transport

Do not hold VEGAVIB 61 on the vibrating element. Especially with flange and tube versions, the sensor can be damaged by the weight of the instrument.

Remove the protective cover just before mounting.

Pressure/Vacuum

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is specified in chapter "*Technical data*" or on the type label of the sensor.

Handling

The vibrating level switch is a measuring instrument and must be treated accordingly. Bending the vibrating element will destroy the instrument.

29268-EN-140625

Warning:
The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing.

Use the hexagon above the thread for screwing in.

4.2 Mounting instructions

Socket

The vibrating element should protrude into the vessel to avoid buildup. For that reason, avoid using mounting bosses for flanges and screwed fittings. This applies particularly to use with adhesive products.

Filling opening

Mount the instrument in such a way that the vibrating rod does not protrude directly into the filling stream.

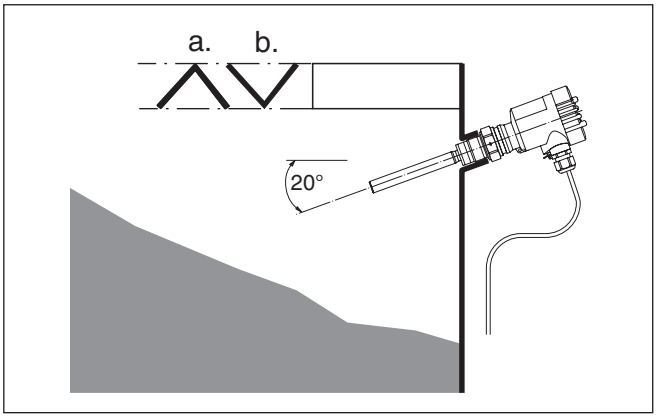

Fig. 3: Horizontal installation

a Protective sheet
b Concave protective sheet for abrasive solids

If such an installation location should be necessary, mount a suitable protective sheet above or in front of the vibrating element, see illustration "a").

In abrasive solids, mounting according to illustration "b" has proven. A spout forms in the concave protective sheet preventing wear of the protective sheet.

Material cone

In silos for bulk solids, material cones can form and change the switching point. Please keep this in mind when installing the sensor in the vessel. We recommend selecting an installation location where the vibrating rod detects an average value of the material cone.

The vibrating rod must be mounted in a way that takes the arrangement of the filling and emptying apertures into account.

To compensate measurement errors caused by the material cone in cylindrical vessels, the sensor must be mounted at a distance of d/6 from the vessel wall.

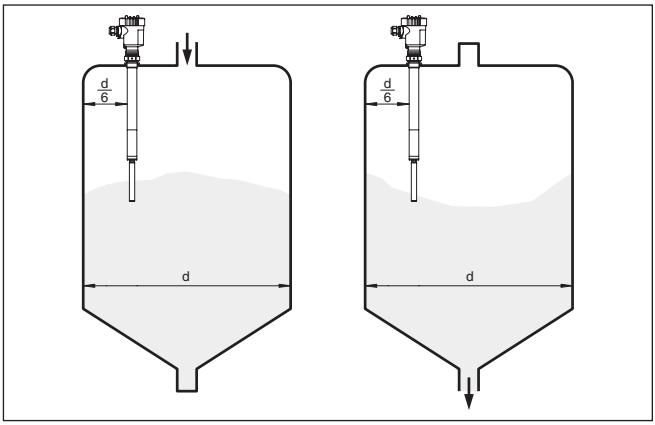

Fig. 4: Filling and emptying centred

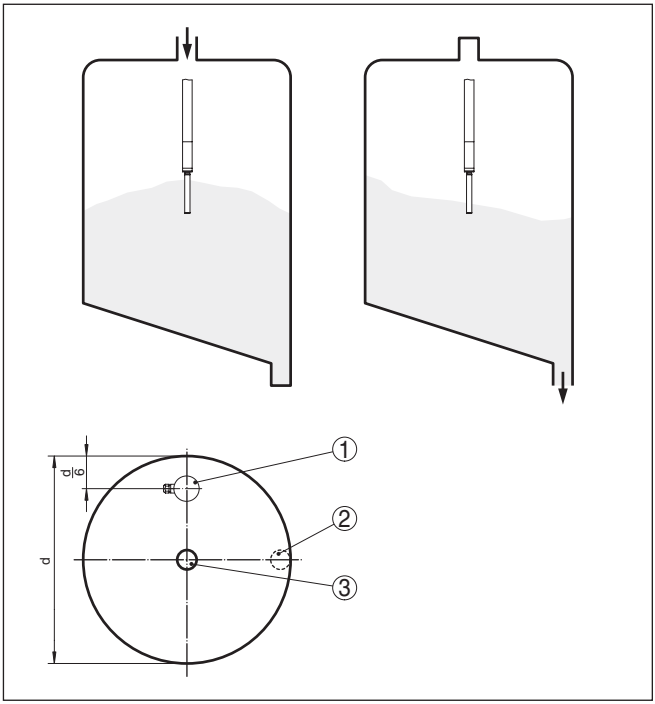

Fig. 5: Filling in the centre, emptying laterally

1 VEGAVIB 61
2 Discharge opening
3 Filling opening

Horizontal installation

To achieve a very precise switching point, you can install VEGAVIB 61 horizontally. However, if the switching point can have a tolerance of a

29268-EN-140625

few centimeters, we recommend mounting VEGAVIB 61 approx. 20° inclined to the vessel bottom to avoid buildup.

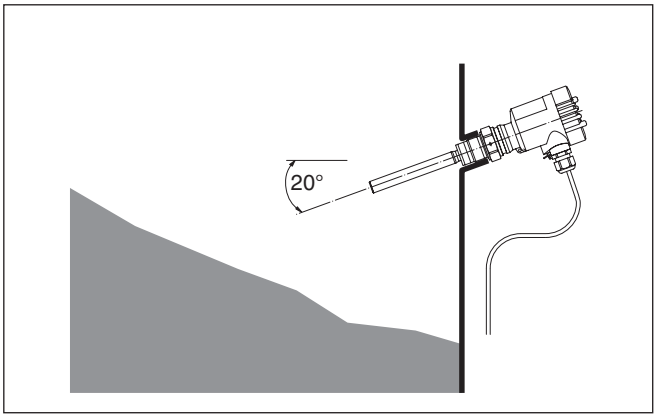

Fig. 6: Horizontal installation

Inflowing medium

If VEGAVIB 61 is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount VEGAVIB 61 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

Baffle protection against falling rocks

In applications such as grit chambers or settling basins for coarse sediments, the vibrating element must be protected against damage with a suitable baffle.

This baffle must be manufactured by you.

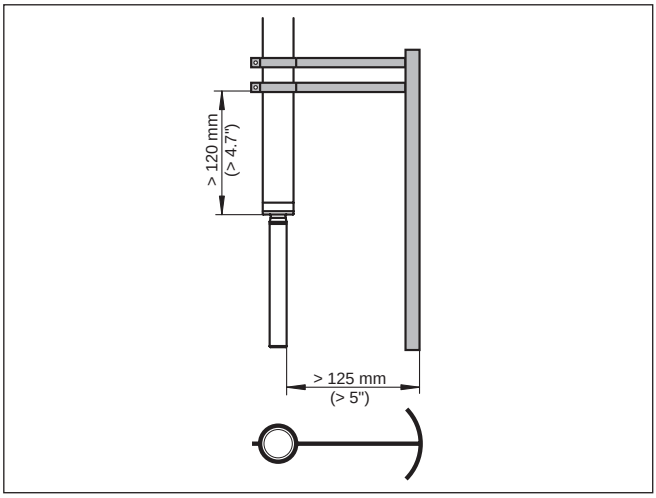

Fig. 7: Baffle for protection against mechanical damage

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

Take note of safety instructions for Ex applications

In hazardous areas you must take note of the respective regulations, conformity and type approval certificates of the sensors and power supply units.

Voltage supply

Connect the operating voltage according to the following diagrams. Take note of the general installation regulations. As a rule, connect VEGAVIB 61 to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the instrument housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

The data for power supply are specified in chapter "*Technical data*".

Connection cable

The instrument is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

In hazardous areas, only use approved cable connections for VEGAVIB 61.

Connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

Cover all housing openings conforming to standard according to EN 60079-1.

5.2 Connection procedure

With Ex instruments, the housing cover may only be opened if there is no explosive atmosphere present.

Proceed as follows:

1. Unscrew the housing cover
2. Loosen compression nut of the cable entry gland
3. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
4. Insert the cable into the sensor through the cable entry
5. Lift the opening levers of the terminals with a screwdriver (see following illustration)

29268-EN-140625

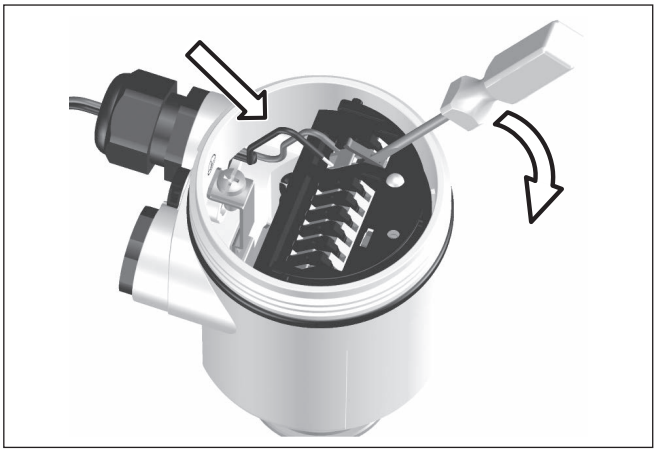

Fig. 8: Connection steps 5 and 6

6. Insert the wire ends into the open terminals according to the wiring plan
7. Press down the opening levers of the terminals, you will hear the terminal spring closing
8. Check the hold of the wires in the terminals by lightly pulling on them
9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable
10. If necessary, carry out a fresh adjustment
11. Screw the housing cover back on

The electrical connection is finished.

5.3 Wiring plan, single chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-d version.

Housing overview

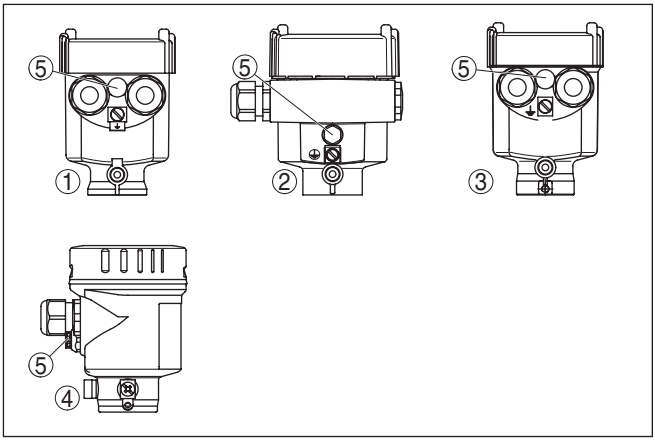

Fig. 9: Material versions, single chamber housing

1 *Plastic (not with EEx d)*
2 *Aluminium*
3 *Stainless steel (not with EEx d)*
4 *Stainless steel, electropolished (not with EEx d)*
5 *Filter element for pressure compensation or blind plug with version IP 66/ IP 68, 1 bar (not with EEx d)*

Wiring plan

For connection to a VEGATOR (Ex) signal conditioning instrument. The sensor is powered by the connected VEGATOR signal conditioning instrument. Further information is available in chapter "*Technical data*", "*Ex-technical data*" are available in the supplied "*Safety information manual*".

The wiring example is applicable for all suitable signal conditioning instruments.

If the mode switch of VEGAVIB 61 is correctly set to "max.", the control lamp on VEGAVIB 61 lights.

- red - with submerged vibrating element
- green - with uncovered vibrating element

Take note of the operating instructions manual of the signal conditioning instrument. Suitable signal conditioning instruments are listed in chapter "*Technical data*".

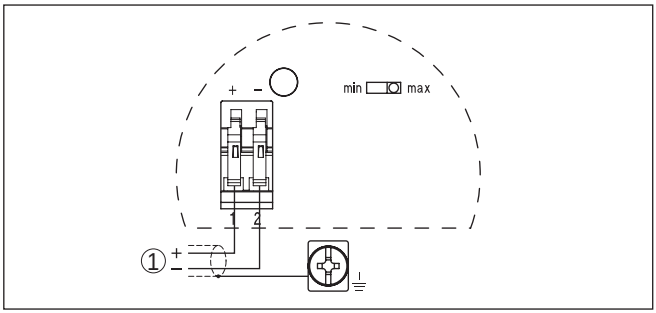

Fig. 10: Wiring plan

1 Voltage supply

5.4 Wiring plan - version IP 66/IP 68, 1 bar

Wire assignment, connection cable

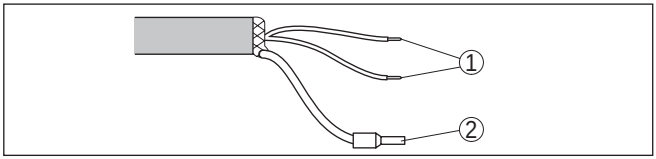

Fig. 11: Wire assignment, connection cable

1 brown (+) and blue (-) to power supply or to the processing system
2 Shielding

6 Setup

6.1 General information

The figures in brackets refer to the following illustrations.

Function/Configuration

On the electronics module you will find the following display and adjustment elements:

- Potentiometer for adaptation to the product density (1)
- DIL switch for mode adjustment - min./max. (2)
- Signal lamp (5)

Note:

As a rule, always set the mode before starting to set up VEGAVIB 61 . If used on a VEGATOR signal conditioning instrument, always set the mode switch (2) on VEGAVIB 61 to max. mode.

The mode is selected on the signal conditioning instrument with the mode switch.

The switching output will change if you set one of the two mode switches afterwards. This could possibly trigger other connected instruments or devices.

6.2 Adjustment elements

Electronics and terminal compartment

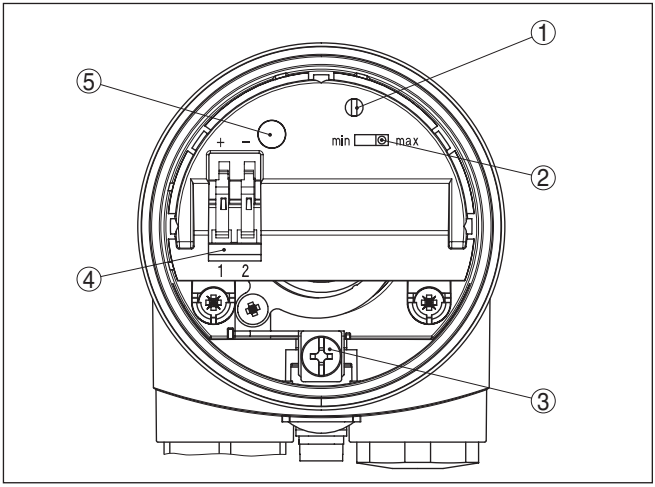

Fig. 12: Electronics and connection compartment - two-wire output

1 Potentiometer for switching point adaptation
2 DIL switch for mode adjustment
3 Ground terminal
4 Connection terminals
5 Control lamp

Switching point adaptation (1)

With the potentiometer you can adapt the switching point to the solid. It is already preset and must only be modified in special cases.

As a default setting, the potentiometer of VEGAVIB 61 is set to the complete right position (> 0.3 g/cm³/0.011 lbs/in³). In very light solids you have to turn the potentiometer to the complete left position (0.02 … 0.1 g/cm³ or 0.0007 … 0.0036 lbs/in³). By doing this, VEGAVIB 61 will be more sensitive and light solids can be detected more reliably.

For instruments detecting solids in water, these settings are not applicable. The switching point adaptation is preset and must not be changed.

Mode adjustment (2)

With the mode adjustment (min./max.) you can determine the output current.

When using a VEGATOR signal conditioning instrument, always set the mode switch to max. mode.

In this case you select the requested mode according to the "*Function chart*" (max. - max. detection or overfill protection, min. - min.detection or dry run detection) on the VEGATOR signal conditioning instrument.

When used on a control system, the following values apply:

- Mode min.
  - Vibrating element uncovered - 16 mA ±1 mA
  - Vibrating element covered - 8 mA ±1 mA
- Mode max.
  - Vibrating element uncovered - 8 mA ±1 mA
  - Vibrating element covered - 16 mA ±1 mA

Signal lamp (5)

Control lamp for indication of the switching status

- green = 8 mA
- red = 16 mA
- red (flashing) = Failure (< 2.3 mA)

6.3 Function chart

Level switch VEGAVIB 61

The following chart provides an overview of the switching conditions depending on the set mode and the level.

Mode on the sensor	Level	Signal current - Sensor	Signal lamp - sensor
Max. Overflow protection		8 mA	 Green
Max. Overflow protection		approx. 16 mA	 Red

Mode on the sensor	Level	Signal current - Sensor	Signal lamp - sensor
Min. Dry run protection		approx. 8 mA	 Green
Min. Dry run protection		approx. 16 mA	 Red
Fault message (min./max. mode)	any	< 2.3 mA	 flashes red

VEGAVIB 61 level switch with signal conditioning instrument[1)]
The following chart provides an overview of the switching conditions depending on the adjusted mode of the signal conditioning instrument and the level.

Note:
Keep in mind that the mode switch of VEGAVIB 61 must be always set to "max.".

Mode on the signal conditioning instrument	Level	Signal current - Sensor	Signal lamp - sensor	Signal lamp - signal conditioning instrument
Mode A Overflow protection		approx. 8 mA	 Green	
Mode A Overflow protection		approx. 16 mA	 Red	○
Mode B Dry run protection		approx. 16 mA	 Red	

[1)] You will find suitable signal conditioning instruments in chapter "Technical data".

Mode on the signal conditioning instrument	Level	Signal current - Sensor	Signal lamp - sensor	Signal lamp - signal conditioning instrument
Mode B Dry run protection		approx. 8 mA	 Green	○
Fault message (mode A/B)	any	< 2.3 mA	 flashes red	○

6.4 Recurring test and function test (SIL)

General information

The VEGAVIB 61 is qualified for use in measuring chains of level SIL2 according to IEC 61508 (redundant, level SIL3).

SIL

The measuring system can be used for level detection of bulk solids and meets the special requirements of safety technology.

This is possible up to SIL2 in a single channel architecture (1oo1D), and up to SIL3 in a multiple channel, redundant architecture.

The following instrument combinations meet the requirements according to SIL:

VEGAVIB 61 Ex with

- Oscillator VB60Z
- Signal conditioning instrument VEGATOR 636 Ex or SPLC (safety-oriented PLC)

Implementation - Function test

There are the following possibilities to carry out the recurring function test:

1. Filling of the vessel up to the switching point
2. Dismounting of the sensor and immersion in the original medium
3. Short interruption of the supply line to the sensor
4. Pushing the test key on the signal conditioning instrument

1 Filling the vessel up to the switching point
If this does not cause any problems, you can fill the vessel up to the switching point and monitor the correct sensor reaction.

2 Dismounting of the sensor and immersion in the original medium
You can dismount the sensor for test purposes and check its proper functioning by immersing it in the original product.

3 Short interruption of the supply line to the sensor
The recurring function test according to IEC 61508 can be carried out through a short interruption (> 2 seconds) of the supply line to the sensor. This starts a test sequence.

The correctness of the subsequent switching conditions on the indications of the SPLC must be monitored. The sensor must neither be dismounted nor triggered by filling the vessel.

You can carry out the function test with the outputted current values also directly via a safety PLC or a process control system.

4 Pushing the test key on the signal conditioning instrument
A test key is lowered in the front plate of the signal conditioning instrument. Push the test key for > 2 seconds with a suitable object. Hence a test is started. Hence the correctness of the subsequent switching conditions must be monitored via the two LEDs on the signal conditioning instrument as well as the connected facilities. The sensor must neither be dismounted, nor controlled by filling the vessel.

Test without filling or dismounting the sensor (3, 4)

This test is valid if you cannot change the vessel filling or cannot dismount the sensor.

The recurring function test according to IEC 61508 can be carried out by pushing the test key on a respective signal conditioning instrument or briefly (> 2 seconds) interrupting the supply line to the sensor.

The correctness of the subsequent switching conditions must be monitored via the two LEDs on the signal conditioning instrument as well as the connected devices. The sensor must neither be dismounted nor triggered by filling the vessel.

This applies for VEGAVIB 61 with two-wire electronics module VB60Z.

You can carry out the function test with the outputted current values also directly via a safety PLC or a process control system.

A function test can be carried out with measurement setups in conjunction with the two-wire electronics module VB60Z EX.

If you are using a signal conditioning instrument of type VEGATOR for this purpose, you can carry out the test with the integrated test key. The test key is recessed in the front plate of the signal conditioning insturment. Push the test key for > 2 seconds with a suitable object (screwdriver, pen, etc.).

When the VEGAVIB 61 is connected to a processing system or an SPLC, you have to interrupt the connection cable to the sensor for > 2 seconds. The switching delay must be set to 0.5 s.

After releasing the test key or interrupting the connection cable to the sensor, the complete measuring system can be checked on correct function. The following operating conditions are simulated during the test:

- Fault message
- Empty signal
- Full signal

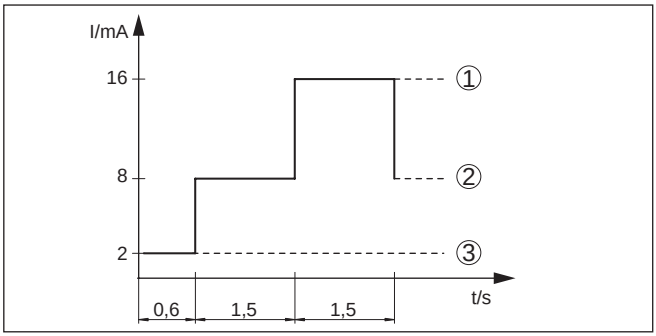

Fig. 36: Flow chart of the function test

1 Full signal
2 Empty signal
3 Fault message

Check if all three switching conditions occur in the correct sequence and the stated time period. If this is not the case, there is a fault in the measuring system (see also the operating instructions manual of the signal conditioning instrument). Keep in mind that connected instruments are activated during the function test. By doing this, you can check the correct function of the measuring system.

Note:
Keep in mind that the starting time t_A of the voltage supply can extend the time up to the first switching (e.g. VEGATOR 636: +1 s)

Test procedure

After releasing the button or after a brief line break.

The specified times apply with a tolerance of ±20 %.

	Sensor current - Sensor	Level relay A - overfill protection	Signal lamp A - Overfill protection	Level relay B - dry run protection	Signal lamp B - Dry run protection	Fail safe relay	Control lamp
1. Fault signal approx. 0.6 s + t_A [2)]	< 2 mA	currentless	○	currentless	○	currentless	☼
2. Empty signal (approx. 1.5 s)	approx. 8 mA	energized	☼	currentless	○	energized	○
3. Full signal (approx. 1.5 s)	approx. 16 mA	currentless	○	energized	☼	energized	○

[2)] Starting time of the voltage supply

	Sensor current - Sensor	Level relay A - overfill protection	Signal lamp A - Overfill protection	Level relay B - dry run protection	Signal lamp B - Dry run protection	Fail safe relay	Control lamp
4. Return to current operating condition							☼

Note:
When used in measuring chains according to IEC 61508, mode B is not permitted.

Test assessment (SPLC)

Test passed

- Interference signal (< 3.6 mA) ≥ 400 ms
- Uncovered (approx. 8 mA) ≥ 1 s
- Covered (approx. 16 mA) ≥ 1 s

Test not passed

- Interference signal (< 3.6 mA) < 400 ms / ≥ 750 ms
- Uncovered (approx. 8 mA) < 1 s / ≥ 2 s
- Covered (approx. 16 mA) < 1 s / ≥ 2 s

7 Maintenance and fault rectification

7.1 Maintenance

If the instrument is used properly, no special maintenance is required in normal operation.

7.2 Rectify faults

Reaction when malfunctions occur

The operator of the system is responsible for taking suitable measures to rectify faults.

Failure reasons

VEGAVIB 61 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measure to be taken is to check the output signal. In many cases, the causes can be determined this way and the faults rectified.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is manned 7 days a week round-the-clock. Since we offer this service worldwide, the support is only available in the English language. The service is free, only standard call charges are incurred.

Checking the switching signal

Error	Cause	Rectification
VEGAVIB 61 signals "covered" without being submerged (overfill protection) VEGAVIB 61 signals "uncovered" when being submerged (dry run protection)	Operating voltage too low	Check operating voltage
	Electronics defective	Press the mode switch. If the instrument then changes the mode, the vibrating element may be covered with buildup or mechanically damaged. Should the switching function in the correct mode still be faulty, return the instrument for repair.
		Press the mode switch. If the instrument then does not change the mode, the electronics module may be defective. Exchange the electronics module.
	Unfavourable installation location	Mount the instrument at a location in the vessel where no dead zones or mounds can form.
	Buildup on the vibrating element	Check the vibrating element and the sensor if there is buildup and remove it.
	Wrong mode selected	Set the mode switch on VEGAVIB 61 to "max". Set the correct mode on the signal conditioning instrument (A: overfill protection; B: dry run protection).

Error	Cause	Rectification
Signal lamp flashes red	Error on the vibrating element	Check if the vibrating element is damaged or extremely corroded.
	Interference on the electronics module	Exchanging the electronics module
	instrument defective	Exchange the instrument or send it in for repair

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "*Set up*" may have to be carried out again.

7.3 Exchanging the electronics module

In general, all electronics modules of series VB60 can be interchanged. If you want to use an electronics module with a different signal output, you can download the corresponding operating instructions manual from our homepage under Downloads.

With Ex-d instruments, the housing cover may only be opened if there is no explosive atmosphere present.

Proceed as follows:

1. Switch off power supply
2. Unscrew the housing cover
3. Lift the opening levers of the terminals with a screwdriver
4. Pull the connection cables out of the terminals
5. Loosen the two screws with a screw driver (Torx size T10 or slot 4)

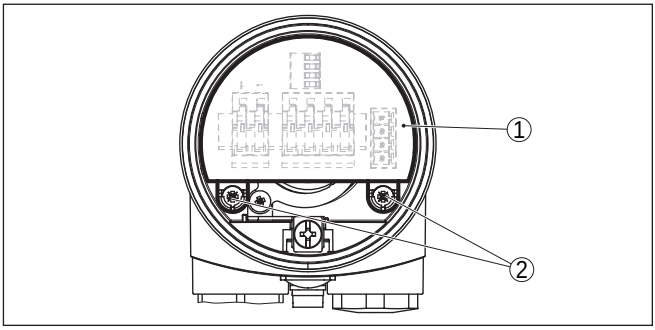

Fig. 47: Loosening the holding screws

1 Electronics module
2 Screws (2 pcs.)

6. Pull out the old electronics module
7. Compare the new electronics module with the old one. The type label of the electronics module must correspond to that of the old electronics module. This applies particularly to instruments used in hazardous areas.

8. Compare the settings of the two electronics modules. Set the adjustment elements of the new electronics module to the same setting of the old one.

Information:
Make sure that the housing is not rotated during the electronics exchange. Otherwise the plug may be in a different position later.

9. Insert the electronics module carefully. Make sure that the plug is in the correct position.
10. Screw in and tighten the two holding screws with a screwdriver (Torx size T10 or Phillips 4)
11. Insert the wire ends into the open terminals according to the wiring plan
12. Press down the opening levers of the terminals, you will hear the terminal spring closing
13. Check the hold of the wires in the terminals by lightly pulling on them
14. Check cable gland on tightness. The seal ring must completely encircle the cable.
15. Screw the housing cover back on

The electronics exchange is now finished.

7.4 How to proceed if a repair is needed

You can find a repair form as well as detailed information on how to proceed at www.vega.com/downloads and "*Forms and certificates*".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

If a repair is necessary, please proceed as follows:

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please contact the agency serving you to get the address for the return shipment. You can find the agency on our home page www.vega.com.

8 Dismount

8.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

With Ex instruments, the housing cover may only be opened if there is no explosive atmosphere present.

8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the parts to be easily separable.

WEEE directive 2002/96/EG
This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

9 Supplement

9.1 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435	
Materials, wetted parts	
– Process fitting - thread	316L
– Process fitting - flange	316L
– Process seal	Klingersil C-4400
– Vibrating rod	316L, 318 S13 (1.4462)
– Extension tube ø 29 mm (1.14 in)	316L
Materials, non-wetted parts	
– Plastic housing	plastic PBT (Polyester)
– Aluminium die-casting housing	Aluminium die-casting AlSi10Mg, powder-coated - basis: Polyester
– Stainless steel housing - precision casting	316L
– Stainless steel housing, electropolished	316L
– Seal between housing and housing cover	NBR (stainless steel housing, precision casting), silicone (aluminium/plastic housing; stainless steel housing, electropolished)
– Light guide in housing cover (plastic)	PMMA (Makrolon)
– Ground terminal	316L
Process fittings	
– Pipe thread, cylindrical (DIN 3852-A)	G1, G1½
– American pipe thread, conical (ASME B1.20.1)	1 NPT, 1½ NPT
Instrument weight (depending on process fitting)	0.8 … 4 kg (0.18 … 8.82 lbs)
Max. lateral load	400 N (90 lbf)

Output variable

Output	Two-wire output
Suitable signal conditioning instruments	VEGATOR 121, 122, 636Ex
Output signal	
– Mode min.	Vibrating element uncovered: 16 mA ±1 mA, vibrating element covered: 8 mA ±1 mA
– Mode max.	Vibrating element uncovered: 8 mA ±1 mA, vibrating element covered: 16 mA ±1 mA
– Fault message	< 2.3 mA
Modes (switchable)	min./max.

Switching delay

– When immersed	0.5 s
– When laid bare	1 s

Ambient conditions

Ambient temperature on the housing	-40 … +80 °C (-40 … +176 °F)
Storage and transport temperature	-40 … +80 °C (-40 … +176 °F)

Process conditions

Measured variable	Limit level of solids
Process pressure	-1 … 16 bar/-100 … 1600 kPa (-14.5 … 232 psig)

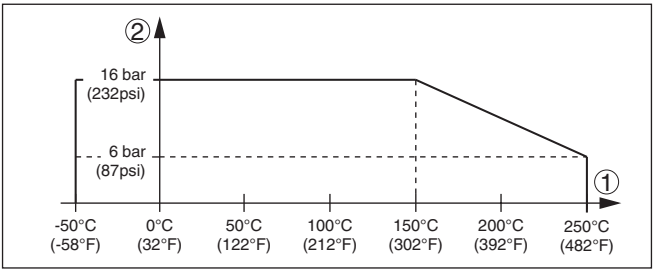

Fig. 48: Process pressure - Process temperature

1 Process temperature
2 Process pressure

VEGAVIB 61 of 316L	-50 … +150 °C (-58 … +302 °F)
Process temperature (thread or flange temperature) with temperature adapter (option)	-50 … +250 °C (-58 … +482 °F)

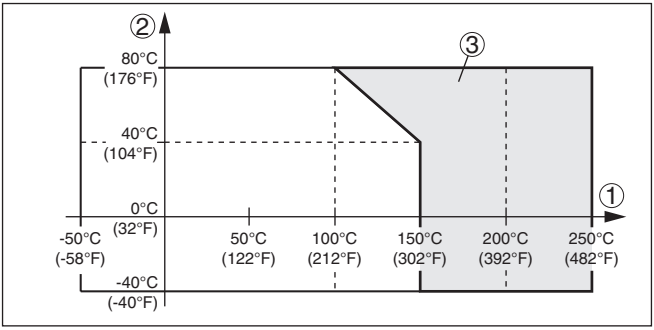

Fig. 49: Ambient temperature - Process temperature

1 Process temperature
2 Ambient temperature
3 Temperature range with temperature adapter

Density

– Standard	> 0.05 g/cm³ (0.002 lbs/in³)

– adjustable	> 0.02 g/cm³ (0.0007 lbs/in³)
Granular size	no limitation[3]

Electromechanical data - version IP 66/IP 67 and IP 66/IP 68; 0.2 bar

Cable entry/plug[4]	
– Single chamber housing	– 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind plug M20 x 1.5 or: – 1 x closing cap ½ NPT, 1 x blind plug ½ NPT or: – 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5
Spring-loaded terminals	for wire cross-section up to 1.5 mm² (AWG 16)

Electromechanical data - version IP 66/IP 68 (1 bar)

Cable entry	
– Single chamber housing	– 1 x IP 68 cable gland M20 x 1.5; 1 x blind plug M20 x 1.5 or: – 1 x closing cap ½ NPT, 1 x blind plug ½ NPT
Connection cable	
– Wire cross-section	> 0.5 mm² (AWG 20)
– Wire resistance	< 0.036 Ω/m (0.011 Ω/ft)
– Tensile strength	< 1200 N (270 lbf)
– Standard length	5 m (16.4 ft)
– Max. length	1000 m (3280 ft)
– Min. bending radius	25 mm (0.984 in) with 25 °C (77 °F)
– Diameter approx.	8 mm (0.315 in)
– Colour - standard PE	Black
– Colour - standard PUR	Blue
– Colour - Ex-version	Blue

Adjustment elements

Mode switch	
– Min.	Min. detection or dry run protection
– Max.	Max. detection or overflow protection

Voltage supply

Operating voltage	10 … 36 V DC (via the signal conditioning instrument)

[3] max. 20 mm (0.8 in) with product density < 0.05 g/cm³ (0.002 lbs/in³).
[4] Depending on the version M12 x 1, according to ISO 4400, Harting, 7/8" FF.

Electrical protective measures	
Protection rating	
– Plastic housing	IP 66/IP 67 (NEMA 4X)
– Aluminium and stainless steel standard	IP 66/IP 68 (0.2 bar), NEMA 6P[5)]
– Aluminium and stainless housing (optionally available)	IP 66/IP 68 (1 bar) NEMA 6P
Overvoltage category	III
Protection class	II

Approvals

Instruments with approvals can have different technical specifications depending on the version.

For that reason the associated approval documents of these instruments have to be carefully noted. They are part of the delivery or can be downloaded under www.vega.com via "*VEGA Tools*" and "*Instrument search*" as well as via "*Downloads*" and "*Approvals*".

9.2 Dimensions

Housing in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar

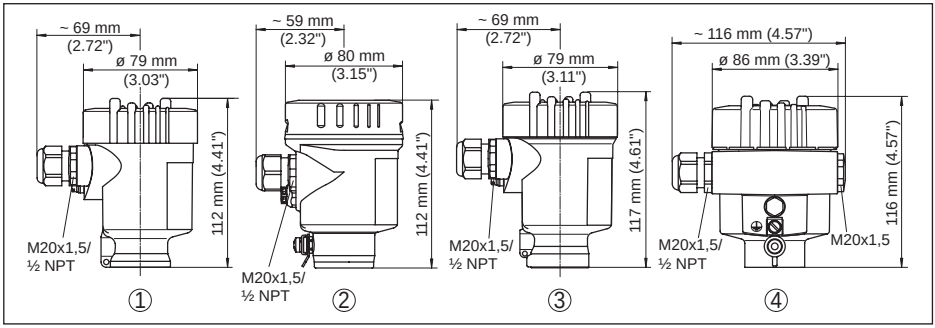

Fig. 50: Housing versions in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar

1 Plastic housing
2 Stainless steel housing, electropolished
3 Stainless steel housing, precision casting
4 Aluminium housing

[5)] A suitable cable is the prerequisite for maintaining the protection rating.

Housing in protection IP 66/IP 68 (1 bar)

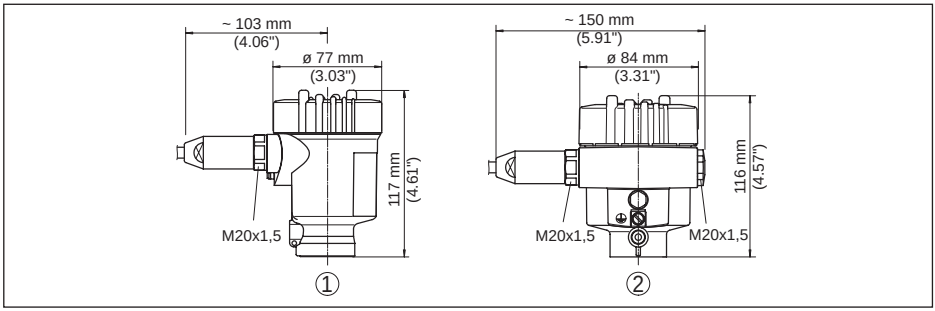

Fig. 51: Housing versions with protection rating IP 66/IP 68 (1 bar)

1 Stainless steel housing, precision casting
2 Aluminium housing

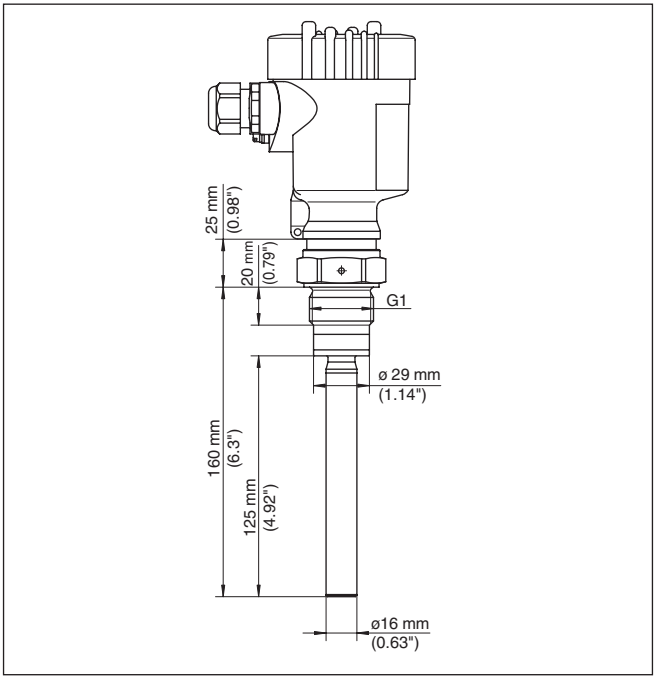

Fig. 52: VEGAVIB 61, threaded version G1 (DIN ISO 228/1)

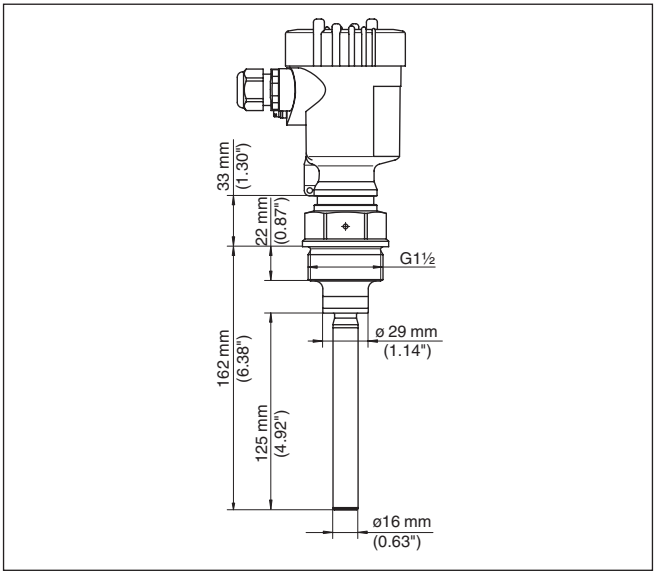

Fig. 53: VEGAVIB 61, threaded version G1½ (DIN ISO 228/1)

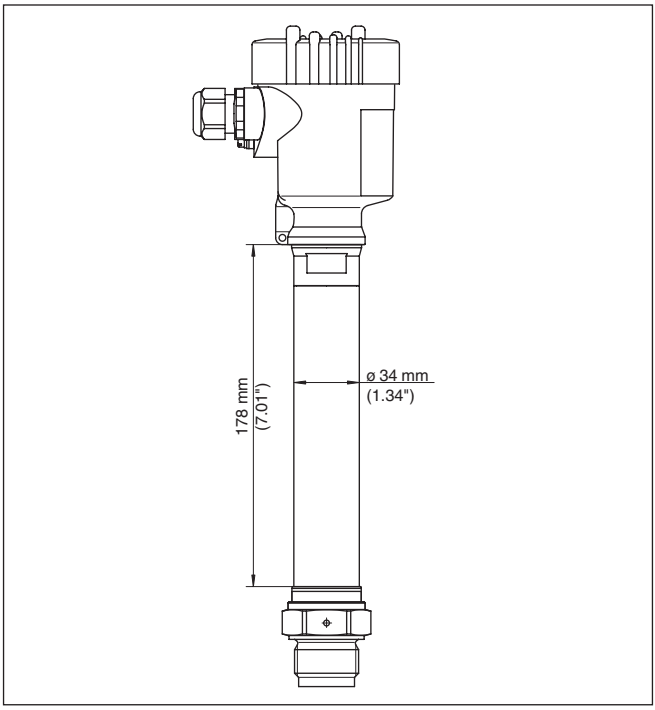

Fig. 54: Temperature adapter

9.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see www.vega.com.

Only in U.S.A.: Further information see patent label at the sensor housing.

VEGA Produktfamilien sind weltweit geschützt durch gewerbliche Schutzrechte.

Nähere Informationen unter www.vega.com.

Les lignes de produits VEGA sont globalement protégées par des droits de propriété intellectuelle. Pour plus d'informations, on pourra se référer au site www.vega.com.

VEGA lineas de productos están protegidas por los derechos en el campo de la propiedad industrial. Para mayor información revise la pagina web www.vega.com.

Линии продукции фирмы ВЕГА защищаются по всему миру правами на интеллектуальную собственность. Дальнейшую информацию смотрите на сайте www.vega.com.

VEGA系列产品在全球享有知识产权保护。

进一步信息请参见网站<www.vega.com。

9.4 Trademark

All the brands as well as trade and company names used are property of their lawful proprietor/ originator.

Printing date:

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.
Subject to change without prior notice

© VEGA Grieshaber KG, Schiltach/Germany 2014

29268-EN-140625

VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach
Germany

Phone +49 7836 50-0
Fax +49 7836 50-201
E-mail: info.de@vega.com
www.vega.com